

Journal,' ser. 2. vol. xxxiii. p. 130, expresses the views advocated herein. The following is an extract therefrom:—

“This is the classification which the writer of the criticism maintains should be sustained; and we cannot see any reasonable objection to it. It is perfectly just towards both M'Coy and D'Orbigny. It inflicts no injustice on any other author. It is not inconsistent with purity of zoological nomenclature, or in any way injurious to science. It does not require any modification in either of the original definitions. The typical species are central and dominant forms of two different groups of species which together form one larger general group. *Athyris*, under this arrangement, is the generic name of that group which has *A. tumida* for its type. *Spirigera* is a perfectly unexceptionable name for the other group, of which the typical form is *S. concentrica*. Prof. Hall's proposed genus *Meristella* is precisely identical with the genus *Athyris* in its restricted sense (as above explained), and cannot be admitted until some good reason is shown for setting aside Davidson's arrangement. It belongs to Prof. Hall to place this reason before the public in a clear and unsophisticated manner. If he succeed in maintaining his point, then he will establish a classification for this group of fossils far inferior to that proposed by Davidson. *Spirigera* must be suppressed, and *Athyris* must take its place, and thus stand as the generic appellation of a group of fossils for which it is not appropriate. We hold that this change is not necessary; and as it would, if adopted, be injurious to science by affecting the purity of zoological nomenclature, it cannot be maintained.”

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XXX.—*Fourth Report on Dredging among the Shetland Isles.*

By J. GWYN JEFFREYS, F.R.S.\*

IN spite of the weather (which was worse than usual in this stormy region), some additional results of no slight interest were obtained. The three requisites of such enterprises (time, money, and experience) were not wanting; and the valuable co-operation of Mr. Norman, Mr. Waller, and Mr. Dodd, aided by a good yacht and crew, and by a large stock of apparatus, left nothing to desire except calmer seas. Dr. Edmonston and his family again did all in their power to promote our endeavours; and Mr. Cheyne of Edinburgh kindly placed his house at Tanwick at our disposal.

Discoveries in natural history are of several kinds, all of which are nearly equally important:—1. New species or forms. 2. Geographical distribution. 3. Habits of animals, including in the present case those supposed to be dependent on the depth of water. 4. Geological relations. 5. Extraneous incidents.

\* Communicated by the author, having been read at the Meeting of the British Association at Dundee, 5th Sept., 1867.

All these I will now notice as regards the Mollusca. Other branches of the marine Invertebrata will be treated of by Mr. Norman, Mr. Waller, and Dr. M'Intosh; and Dr. Günther has kindly promised to report on a few small fishes caught in the dredge.

1. *New Species*.—The species I am about to enumerate are new to the British fauna, but not to science.

*Terebratella Spitzbergensis*, Davidson.

A fresh and perfect, although dead, specimen occurred in 80–90 fathoms off Unst. The only locality hitherto recorded for this shell in a living state is Spitzbergen. It was found by Hisinger and myself in a fossil state at Uddevalla, and last year by Messrs. Crosskey and Robertson in another raised sea-bed near Christiania. There is, of course, a possibility that the Shetland specimen also may be fossil; but it has all the appearance of being recent; and *Terebratula cranium* and *T. caput-serpentis* (both of which are likewise arctic species) live in the same place where this specimen of *Terebratella Spitzbergensis* was dredged.

*Rhynchonella psittacea*, Gmelin.

A specimen (unfortunately broken in dredging) was found with *Terebratella Spitzbergensis*, *Terebratula cranium*, and *T. caput-serpentis*. This was filled with soft mud, in which was a fresh, but dead, young specimen of *R. psittacea*. I had on a former occasion dredged a full-grown specimen and a young one (both quite perfect, although not living) off Unst. In 'British Conchology,' vol. ii. pp. 22 & 23, is an account of all the specimens said to have been taken by Capt. Laskey and others in the British seas; and I am still convinced that most of these reported discoveries were mistakes, and that some of the specimens are fossil. The present case is free from doubt, except on the latter ground. Single valves of *Pecten Islandicus*, *Tellina calcaria*, and *Mya truncata*, var. *Uddevallensis*, are not uncommon on the northern and eastern coasts of Shetland, and were procured with *T. Spitzbergensis* and *R. psittacea*; but the former had an unmistakeably fossilized or chalky aspect, and never were perfect or had the valves united. It seems to be an established rule that all marine invertebrate animals increase in bulk northwards; and thus the comparative size of living and dead specimens of arctic species found in the Shetland seas may serve as an additional test to distinguish which of the latter were recent and which fossil. The two Brachiopods in question must, I think, stand or fall together as British. Mr. Davidson (the great authority on this abnormal class of the Mollusca) says

that, under the circumstances I have mentioned, "there appears to be a probability that these two species may occur somewhere in the neighbourhood—if not quaternary; but if this last, I hardly think they would have been so perfect and fresh as you describe them to be." Professor Lovén, who has examined my specimens, considers them recent. According to Professor Sars, *R. psittacea* inhabits the coast of Finmark, as far south as Tromsø ( $69^{\circ} 40'$  N. lat.), at depths of from 20 to 80 fathoms. Mr. M'Andrew dredged it off Drontheim and in Upper Norway, at depths of from 40 to 150 fathoms. Drontheim lies in  $63^{\circ}$  N. lat., Unst in about  $61^{\circ}$ .

*Leda pernula*, Müller.

A valve, apparently fossil, was dredged on the northern coast; and several valves in a fresh state (partly covered with a glossy epidermis) and a small perfect but dead specimen were dredged in St. Magnus Bay, on the west coast, at a depth of from 60 to 80 fathoms. As no glacial fossils of arctic kinds occurred on the west coast, I have no hesitation in regarding *L. pernula* as British. I had in former expeditions dredged small valves and a complete pair east of Shetland and in the Hebrides. This species inhabits the Scandinavian coasts, as far south as Kullen in Sweden, from 20 to 150 fathoms; and M'Andrew records a depth of 160 fathoms: it is widely diffused over the arctic seas of both continents, and it is also one of our post-tertiary or quaternary fossils.

The next two species are especially interesting, in respect both of novelty and of the classification of the Mollusca. They belong to the class Solenoconchia (Solenoconchæ, Sars, or Scaphopoda, Bronn), which is represented by the genus *Dentalium*. I have elsewhere so fully treated of this remarkable class that I will now offer merely a few remarks as to the genus *Siphonodentalium* of Sars, to which or an allied genus the species now about to be noticed must be referred. *Siphonodentalium* (perhaps the type of a separate family of Solenoconchia) is distinguished from *Dentalium* by having an extensile worm-like foot, the disk of which expands in the shape of a flower and is furnished with a spike, by the mouth or anterior orifice of the shell being obliquely truncated (in *Dentalium* it is circular), and by the posterior or smaller orifice having its margin serrated or slit on each side, instead of this orifice being furnished with a short pipe or having its margin slit on one side only. I am inclined to refer one of the species now discovered as British to the genus *Siphonodentalium*, and the other to the genus *Cadulus* of Professor Philippi\*. In the latter genus (which Philippi

\* Moll. Sic. ii. p. 209.



proposed for the reception of a small Sicilian fossil—his *Dentalium ovulum*) the shell is not cylindro-conical as in *Siphonodentalium*, but is tumid in the middle or anterior portion, sometimes awl-shaped; and the mouth is encircled by a narrow rim. In *Cadulus* the shell is quite smooth, transparent, and lustrous; in *Siphonodentalium* it is striated or exhibits the lines of growth, and is semitransparent. The long-lost *Dentalium gadus* of Montagu, an allied species (*D. clavatum* of Gould) from the China Sea, another species which I observed in the late Mr. Cuming's collection, from Mindanao (erroneously named *D. acuminatum*, Deshayes), and *D. coarctatum* of Lamarck (a tertiary fossil) apparently belong to *Cadulus*, and certainly not to *Ditrypa* (properly *Ditrypa*)—a genus of testaceous Annelids the shell of which is different in structure and composition from that of *Cadulus* or of *Siphonodentalium* (the mouth is contracted or pinched-in), and the animal is annulose and has a circular operculum. On the other hand, several kinds of shelly cases described as *Dentalia* really belong to *Ditrypa*. If *Cadulus* is not generically distinct from *Siphonodentalium*, the former of these names has priority; and we shall thus be able to expunge a more than sesquipedalian name from the terminology of the Mollusca. The diagram now exhibited is an enlarged representation of the figures of *S. Lofotense* and *S. subfusiformis*, in an admirable paper by Professor Sars, published in the Transactions of the Academy of Sciences at Christiania for 1864; and it will serve to explain the nature of these extraordinary mollusks. One of our species is

*Siphonodentalium Lofotense*, Sars

("Malacozoologische Jagttagelser," in Vid.-Selsk. Forh. 1864, p. 17, figs. 29–33), ranging from the Loffoden Isles to Christianiafiord, at depths of between 30 and 120 fathoms. It was rather plentiful among sandy mud in St. Magnus Bay, at the depth of from 60 to 80 fathoms; and I had found it in 1846 when dredging off Skye, in 1864 off Unst, and last year in the Minch. The shell may easily be passed over (as it was by me) for the young of *Dentalium entalis*; but it is more curved and cylindrical, the mouth and corresponding lines of growth slope backwards, and the margin of the posterior orifice is regularly jagged (having two slight notches on each side), and this extremity does not form a bulbous point in the fry. One of the characters given by Sars ("margine aperturæ posterioris integro") should be amended. My observation of the animal agreed with his, except that the foot is vermiform and has a fine point, the disk being expanded and assuming the shape of a flower only when the *Siphonodentalium* wishes to obtain a fulcrum and keep its place in the sand. The foot of *Nucula*

and *Leda* is somewhat similar, its disk when expanded resembling the leaf of a palm. Another species of *Siphonodentalium* proper is *Dentalium quinquangulare* of Forbes, from the Ægean (80–230 fathoms), which M'Andrew afterwards dredged off the coasts of Portugal and Spain in 5–30 fathoms, and named (lapsu calami) *D. quadrangulare*; this species Sars lately procured from the Loffoden Isles and Christianiafiord in 50–300 fathoms, and described as *S. pentagonum*. The coincidence of the first and last of these specific names is curious. *D. bicarinatum* of Deshayes (a tertiary fossil) may also be referable to the genus *Siphonodentalium*. *D. bifissum* of Searles Wood, from the Coralline Crag, is possibly the type of another genus, for which I would suggest the name of *Dischides*. This species has been dredged in a living state off Gibraltar by Mr. M'Andrew. I suspected that *D. bifissum* might be the tube of a young *Teredo norvegica*, on account of its having a septal process within the posterior orifice: at all events my remark is justified by the affinity which exists between the *Teredinidæ* and the *Solenonchida*.

The second species of this class is

*Cadulus subfusiformis*, Sars

(*Siphonodentalium subfusiforme*, l. c. p. 21, figs. 36–44), having a Norwegian distribution equally extensive with that of *S. Lofotense*, but attaining a greater depth, viz. from 50 to 300 fathoms. I noticed specimens among the fossils collected last year by Messrs. Crosskey and Robertson in a raised sea-bed at Barholmen, near Christiania. It occurred on the Unst ground, in 80–90 fathoms, and was apparently not rare. Mr. Peach detected a specimen in looking over some sand which I dredged there in 1864; this I at the time regarded as a *Ditrypa*. The margin of the posterior orifice has two slight indentations or notches, one on each side; and Sars's statement that the margin is entire was perhaps founded on imperfect specimens. *C. subfusiformis* may be known from *C. gadus* not only by its much smaller size, but also by having the greatest width or diameter in the middle (instead of in the upper or anterior part), and by the posterior or narrower part being abruptly curtailed. *C. gadus* is awl-shaped, and has a tapering extremity. *C. subfusiformis* is gibbous. Whether *C. gadus* inhabits our seas is questionable. Montagu says\*, "This is a pelagic species, found in many parts of the British Channel, and is known to mariners by the name of 'hake's tooth,' who frequently find it within soundings, adhering to the log-line (as we are informed), but most likely to

\* Test. Brit. i. p. 496.



the plumb-line." My specimens are from the collections of Dr. Turton and Mr. George Humphreys; the latter dealt almost exclusively in exotic shells. Rang placed *D. gadus* in his genus *Creseis*, among the Pteropoda; but Philippi rightly objected to such a classification, because the shells of all Pteropods are closed at the smaller end.

The sixth and last addition to our molluscan fauna is

*Utriculus globosus*, Lovén

(*Amphisphyræ globosa*, Ind. Moll. Scand. p. 11). Two living specimens were dredged in St. Magnus Bay, with *Leda pernula* and *Siphonodentalium Lofotense*. Its original distribution extended from Finmark to Bohuslän in the south of Sweden; and through the kindness of the discoverer and Professor Lilljeborg I have been enabled to compare the Shetland specimens with those from the Scandinavian coasts. I mention this, because (before I was thus favoured, and when I had only Lovén's description to consult) I mistook this species for another, which I have lately described as *U. ventrosus*, from Skye.

2. *Geographical distribution*.—The accompanying list\* of all the Mollusca hitherto observed in Shetland and the adjacent seas will serve to show the relations which exist between these and the Mollusca of the north and south of Europe. The number of Shetland species is 363, of which 315 inhabit the north and 245 the south of Europe. The total number of the British Mollusca, so far as I have yet worked out the subject, is 712. It may be remarked what a scanty proportion the land and freshwater Mollusca of Shetland bear to those of Great Britain, viz. 23 only out of 122. The marine species, however, are 338 out of 590—although the Zetlandic Nudi-branchs and Cuttles have not been well examined, and, of the former, 28 only out of 110 have been as yet observed.

Some species are now for the first time recorded as Zetlandic, e. g. *Terebratella Spitzbergensis*, *Montacuta tumidula*, *Siphonodentalium Lofotense*, *Cadulus subfusiformis*, *Rissoa proxima*, *Odostomia clavula*, and *Utriculus globosus*. Other species, either rare or local, which I had previously dredged on the eastern and northern coasts, were found this year on the western coast also. Such are *Pecten Testæ*, *Lima Sarsii*, *L. elliptica*, *Leda pernula*, *Axinus ferruginosus*, *Isocardia cor*, *Tellina balaustina* (one living specimen being fully an inch in breadth), *Panopea plicata*, *Rissoa Jeffreysi*, *Aclis supranitida*, *A. Walleri*, *Odostomia minima*, *O. eximia*, *Eulima intermedia*, *Natica sordida*, *Aporrhais Macandreae*, *Cerithiopsis costulata*, *Buccinum Humphreysianum*, *Colum-*

\* This list will be published in the Reports of the British Association.

*bella nana*, *Pleurotoma brachystoma*, *Cylichna acuminata*, *Philine quadrata*, and *P. nitida*.

3. *Habits of Animals*.—Species which were supposed to inhabit shallow water only were found living at considerable depths. In this category may be mentioned *Natica catena*, which was dredged alive in from 40 to 50 fathoms. Capt. Thomas informs me that he also dredged this species in the Orkneys living at the same depth. A dead specimen of *Stilifer Turtoni* was procured with *Natica catena*. Bathymetrical conditions are not of so much consequence to the Mollusca as a suitable habitation and a good feeding-ground. We had the good fortune of dredging in 170 fathoms—a greater depth than had been previously explored in the British seas. This was about forty miles N.N.W. of Unst. The ground was stony intermixed with patches of sand. The greatest depth recorded as having been dredged in our seas was 145 fathoms, by Admiral Beechey, off the Mull of Galloway. The following is a list of the Mollusca which I examined from our dredging in 170 fathoms :—

Living.—BRACHIOPODA : *Terebratula cranium*, young ; *T. caput-serpentis*, young ; *Crania anomala*. CONCHIFERA : *Anomia ephippium*, young ; *A. patelliformis*, var. *striata* ; *Lima subauriculata*, young ; *Leda pygmæa* ; *Montacuta substriata*, on *Spatangus meridionalis*? ; *Venus ovata* ; *Lucinopsis undata*, young ; *Saxicava rugosa*. SOLENOCONCHIA : *Dentalium entalis*, var. *anulata*. GASTROPODA : *Trochus occidentalis* ; *Eulima bilineata* ; *Natica Montacuti* ; *Trophon Barvicensis*.

Dead.—CONCHIFERA : *Pecten septemradiatus*, a fragment ; *P. tigrinus*, ditto ; *P. similis*, a single valve ; *Crenella decussata*, fragments ; *Nucula nucleus*, single valves ; *N. tenuis*, ditto ; *Leda minuta*, a single valve ; *Limopsis aurita*, small but fresh single valves ; *Arca pectunculoïdes*, single valves ; *Lucina borealis*, perfect ; *Axinus Croulinensis*, single valves ; *Cardium fasciatum*, ditto ; *C. minimum*, ditto ; *Astarte sulcata*, ditto ; *Venus lincta*, ditto ; *Tellina balaustina*, a fragment ; *Psammobia Ferröensis*, ditto ; *Mactra solida*, var. *elliptica*, single valves ; *Scrobicularia prismatica*, a fragment ; *Thracia papyracea*, var. *villosiuscula*, young ; *Neæra cuspidata*, a fragment. GASTROPODA : *Tectura fulva*, var. *albula* ; *Propilidium ancyloïdes* ; *Emarginula fissura* ; *Trochus amabilis*, young ; *T. millerianus*, ditto ; *Turritella terebra*, var. *nivea* ; *Natica Alderi* ; *Trichotropis borealis* ; *Buccinopsis Dalei*, a fragment ; *Fusus gracilis*, young ; *F. propinquus*, ditto ; *Defrancia teres* ; *D. linearis*, var. *æqualis*, a fragment ; *Pleurotoma costata*, ditto ; *Cylichna alba*, ditto. PTEROPODA : *Spirialis retroversus* ; *Clio* or *Cleodora cuspidata*, a fragment.

Of these species sixteen were living, and thirty-eight dead—



in all, fifty-four. They comprised some rarities, viz. *Terebratula cranium*, *Limopsis aurita*, *Axinus Croulinensis*, *Trochus amabilis*, *Buccinopsis Dalei*, and *Cylichna alba*. The shells were of the usual colour; indeed this was brighter and darker in living specimens of *Venus ovata* and *Eulima bilineata* than in average examples of the same species taken in a few fathoms. The notion that colour is absent or fainter in shells from deep water seems to be quite unfounded.

4. *Geological Relations*.—Fossil shells (being relics of the glacial epoch) occurred in 170 fathoms and higher up to 80 fathoms. They were chiefly *Pecten Islandicus*, *Tellina calcaria*, *Mya truncata*, var. *Uddevallensis*, *Saxicava rugosa*, var. *Uddevallensis*, *Mölleria costulata*, and *Trochus cinereus*. All these species and varieties inhabit high northern latitudes, and none of them have been discovered living in our seas. No such fossils were detected on any part of the western coast of Shetland.

5. *Extraneous incidents*.—In the dredged stuff taken from a depth of about 85 fathoms, on a soft sandy bottom, twenty-five miles N.N.W. of Unst, I found the canine tooth of an animal of the weasel tribe; and Mr. Waller found the shoulder-blade of a much smaller quadruped. These occurred within a comparatively small space, although not together, and they were unaccompanied by any other land organisms. The socket of the tooth and the bone were corroded. It is possible that the tooth was that of a tame ferret, which was accidentally killed in 1862 and thrown into the sea at Balta, at a distance of about thirty-five miles from the place where the tooth was dredged. The tide sets with great rapidity in that direction; and when the carcase became distended by the gases evolved during putrefaction, it must have floated for some time. The bone is supposed by Mr. Boyd Dawkins to be that of a bat; this may have been eaten by a snowy owl, and disgorged or voided on its way back to the Faroe Isles or Iceland. I mention this curious circumstance to show that the bones of quadrupeds as well as of man may be preserved for a long time in "the slimy bottom of the deep," without being disturbed by the naturalist. When we consider the vast extent of the sea-bed, and the very trifling and unfrequent operations of the dredge (the one being measured by square nautical degrees, and the other by square yards), we ought not to be surprised that the remains of drowned mariners (at least their teeth) are not thus brought to light. Clarence's dream (the creation of a sublime poet) is never likely to be verified by modern research.

I have had much pleasure in presenting a collection of the rarer shells to our national Museum.